

Study Guide

For use with pages 138–142

GOAL Solve inequalities using addition or subtraction.**VOCABULARY**

An **inequality** is a statement formed by placing an inequality symbol between two expressions. For example, $y + 5 \leq -6$ is an inequality.

The **solution of an inequality** with a variable is the set of all numbers that produce true statements when substituted for the variable.

Equivalent inequalities are inequalities that have the same solution.

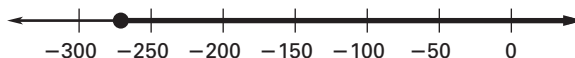
EXAMPLE 1 Writing and Graphing an Inequality

Helium is the element with the lowest melting point, -272.2°C . Write an inequality that describes the melting point p (in degrees Celsius) of any other element.

Solution

Let p represent the melting point of any element. The lowest melting point is -272.2°C .

Answer: The inequality is $p \geq -272.2$. The graph is shown below.

**Exercises for Example 1**

Write an inequality to represent the situation.

1. You need at least 85 points on the final exam to get an A in your math class.
2. You are willing to spend up to \$7500 on a used car.

EXAMPLE 2 Solving an Inequality Using Subtraction

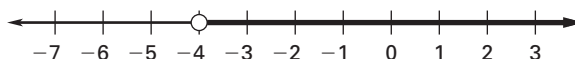
Solve $y + 11 > 7$. Graph your solution.

$$y + 11 > 7 \quad \text{Write original inequality.}$$

$$y + 11 - 11 > 7 - 11 \quad \text{Subtract 11 from each side.}$$

$$y > -4 \quad \text{Simplify.}$$

Answer: The solution is $y > -4$.



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EXAMPLE 3 Solving an Inequality Using AdditionSolve $u - 31 < -22$. Graph and check your solution.

$$u - 31 < -22 \quad \text{Write original inequality.}$$

$$u - 31 + 31 < -22 + 31 \quad \text{Add 31 to each side.}$$

$$u < 9 \quad \text{Simplify.}$$

Answer: The solution is $u < 9$.**✓ Check** Choose any number less than 9. Substitute the number into the original inequality.

$$u - 31 < -22 \quad \text{Write original inequality.}$$

$$0 - 31 \stackrel{?}{<} -22 \quad \text{Substitute 0 for } u.$$

$$-31 < -22 \quad \checkmark \quad \text{Solution checks.}$$

Exercises for Examples 2 and 3**Solve the inequality. Graph and check your solution.**

$$3. \ y - 12 < -13 \quad 4. \ t + 18 > 10 \quad 5. \ -9 \geq m + 7 \quad 6. \ -3 \leq x - 6$$

EXAMPLE 4 Writing and Solving an Inequality

You have 120 minutes this evening to exercise, eat dinner, and clean your room. It takes you 45 minutes to exercise and 25 minutes to eat dinner. What possible amounts of time can you spend cleaning your room?

SolutionLet t represent the time, in minutes, you spend cleaning. Write a verbal model.

Exercise time	+	Dinner time	+	Cleaning time	≤	Amount of time you have
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$$45 + 25 + t \leq 120 \quad \text{Substitute.}$$

$$70 + t \leq 120 \quad \text{Simplify.}$$

$$t \leq 50 \quad \text{Subtract 70 from each side and simplify.}$$

Answer: You can spend 50 or less minutes cleaning your room.**Exercise for Example 4**

7. You owe your parents \$95. You have \$38 cash, \$20 in savings, and a job scheduled for this weekend. What possible amounts can you earn at the job in order to be able to pay your parents back in full?